

## **REMARKS**

### **A. The Status of the Claims and the Amendments**

Claims 1 and 24-26 have been amended. Claim 28 have been added. The Applicant acknowledges that the restriction requirement was made final (item 1 on page 2 of the office action). Claims 4-23 and 27 have been withdrawn from consideration as non-elected. Accordingly, claims 1-3, 24-26, and 28 are currently under consideration. The claims amendments clarify the language of the claims and harmonize the language of the claims with the specification.

In particular, the limitation "a non-constricted undivided fluid chamber" added to claims 1 and 24 is disclosed on page 5, line 16 of the original specification describing an undivided cylindrical capillary, and on page 6, line 6 of the original specification disclosing that the cylindrical capillary is non-constricted. Further support for the "a non-constricted undivided fluid chamber" feature can be found on the original FIGs. 2 and 3 illustrating a single-cavity chamber 20, within which the fluid flow is unimpeded by any obstacle.

The limitation "two piezoelectric actuators" introduced in claim 1 is disclosed on page 5, line 20, and by FIG. 3 of the original specification. This limitation is also claimed in the original claim 25.

The limitation "sequentially actuate" introduced in claim 1 is disclosed on page 9, lines 3-5, disclosing non-simultaneous actuating of the first piezoelectric actuator 28 and the second piezoelectric actuator 30, where the second actuator 30 is pulsed earlier than the first actuator. Sequential actuation is also claimed in the original claim 2.

Accordingly, it is submitted that the claims amendments do not introduce any new matter.

**B. Rejection Under 35 U.S.C. § 112, First Paragraph (Written Description)**

Claim 2 has been rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which allegedly was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention (item 2 on page 2 of the Office Action). This rejection is respectfully traversed.

It is submitted that the Examiner has not met the burden of demonstrating that claim 2 is not supported by an adequate written description. This burden is squarely the Examiner's, as required by *In re Wertheim*, 541 F.2d 257, 263, 191 USPQ 90, 97 (CCPA 1976). MPEP specifically states that a strong presumption of adequacy of written description exists and directs that § 112, paragraph 1 rejections of an original claim should be rare. MPEP §§ 2163(I)(A) and 2163(II)(A).

The legal standard for determining the adequacy of written description is clear and well established. The description is adequate if "the disclosure of the application relied upon reasonably conveys to the artisan that the inventor had possession at [the time of filing] of the later claimed subject matter." *Wang Labs Inc. v. Toshiba Corp.*, 993 F.2d 858, 26 USPQ2d 1767. In other words, the question of the lack of adequate written description does not arise unless "one skilled in the art [would not be able] to immediately envisage the product claimed..." *Fujikawa v. Wattanasin*, 93 F.3d 1559, 39 USPQ2d 1895. It is submitted that applying these broad principles to the pending claims, it can be unequivocally concluded that the written description in this application adequately supports the claims.

More particularly, the Examiner has asserted that it is not clear if having the driver connected to actuate both simultaneously and sequentially has support or adequate written description in the original specification. The Applicant respectfully disagrees. Claim 1 has been amended and now recites that the "driver is connected to substantially simultaneously or

amended and now recites that the “driver is connected to substantially simultaneously or sequentially actuate” the first and the second actuators. The embodiment describing the simultaneous actuating is described on page 7, line 15-16 of the specification. An alternative embodiment describing the sequential actuating is described on page 9, lines 3-5 of the specification. The two alternative embodiments are completely consistent. In one embodiment, the actuation takes place at the same moment of time for both actuators. In another embodiment, the physical set-up of the apparatus is the same, but the second actuator is actuated somewhat earlier than the first actuator. Both embodiments are present in the written description in a very clear and precise form.

In view of the foregoing, the Applicant submits that the present specification contains a complete description of the invention sufficient to demonstrate that the Applicant, at the time the application was filed, had possession of the claimed invention. Accordingly, it is respectfully submitted that the rejection of claim 2 under 35 U.S.C. § 112, first paragraph, as allegedly lacking adequate written description, does not apply. Reconsideration and withdrawal of the rejection are therefore respectfully requested.

**C. Rejection Under 35 U.S.C. § 112, Second Paragraph**

Claim 2 has been rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for allegedly failing to particularly point out and distinctly claim the subject matter which the Applicants regard as the invention (item 3 on page 2 of the Office Action). This rejection is respectfully traversed.

Claim 1 has been amended and now recites “substantially simultaneous” actuation or “sequential” actuation in the alternative. Therefore, the driver does not act both sequentially and simultaneously, as stated by the Examiner. Instead, in some embodiments the same driver is

capable of triggering the simultaneous actuation and in other embodiments – to trigger the sequential actuation. Claim 2 is directed to the embodiment where the actuation is sequential.

In view of the foregoing, it is respectfully submitted that the rejection of claim 2 under 35 U.S.C. § 112, second paragraph, does not apply. Reconsideration and withdrawal of the rejection are therefore respectfully requested.

**D. Rejections Under 35 U.S.C. § 103 (a)**

Claims 1-3 and 24 have been rejected under 35 U.S.C. § 103(a), as allegedly being unpatentable over the patent document WO 97/48557 (“the ‘557 document”) (item 6 on page 3 of the Office Action). In addition, claims 1-3 and 24-26 have been rejected under 35 U.S.C. § 103(a), as allegedly being unpatentable over U.S. Patent No. 4,231,047 to Iwasaki et al. (item 7 on page 3 of the Office Action). These rejections are respectfully traversed.

To establish a *prima facie* case of obviousness, the three basic criteria must be met: (1) there must be some suggestion or motivation to modify the reference as proposed by the Examiner; (2) there must be a reasonable expectation of success and (3) the prior art reference must teach or suggest all of the claim limitations. The Applicant respectfully submits that none of the criteria has been satisfied in this case.

With regard to the ‘557 document, the document fails to describe a device having a non-constricted undivided fluid chamber and two piezoelectric actuators, as recited in the amended claims 1 and 24. The ‘557 document describes two different types of apparatuses.

The first type of the apparatus taught by the ‘557 document has a divided (bi-cameral) fluid chamber. See, page 11, lines 8-9 and FIGs. 8A-8C of the ‘557 document describing and showing the chamber 102 divided into two distinct sections, the deposition chamber 104 and the feed chamber 106, connected by the narrow channel 108. The second type of the apparatus taught by the ‘557 document has a single undivided fluid chamber. See, page 14, lines 1-3 and

FIG. 10 of the '557 document describing and showing the reservoir 152. The second type also contains the throttle 164 separating the pressure generation section 154 from the nozzle section 156. The throttle serves as a valve, thus constricting the flow of the fluid through the chamber.

Therefore, the '557 document teaches either a divided (bi-cameral) chamber (type I, FIGs. 8A-8C) or a constricted chamber (type II, FIG. 10). There is no teaching in the '557 document showing an apparatus having a fluid chamber which is both undivided and non-constricted, as required by claims 1 and 24. There is no suggestion or motivation in the '557 document to modify its teachings that would lead one having ordinary skill in the art to the embodiments claimed in claims 1 and 24.

To illustrate the lack of suggestion or motivation, one problem that occurs in the type I apparatus is identified in the '557 document as pressure equalization on both sides of the channel 108. As a result, the flow of the fluid through the channel can stop (see, page 13, lines 8-9). There is no suggestion to solve this problem by switching to an undivided chamber. Instead, the '557 document teaches that the problem can be solved by utilizing a greater pressure pulse the chamber 106. Since the problem can be solved by applying higher pressure (for which purpose two actuators 120 and 122 are used with the chamber 106), and there is no indication that using these two actuators can be inadequate, there is no motivation to do anything else, like using an undivided chamber.

With regard to the single-chamber type II apparatus, the throttle restricting the flow and acting as a valve will inherently slow down the flow rate. Clearly, it is for this reason that three actuators 158, 160, and 162 are used in this embodiment. In the type II apparatus, the potential problem of insufficient flow is solved by using three actuators and the use of the throttle serving as a valve is essential; therefore, there is no motivation to switch to an embodiment with a non-constricted chamber, i.e., the embodiment having a unicameral chamber without the throttle.

As can be seen from the discussion above, in any embodiment shown by the '557 document, using of not less than three actuators is essential. Indeed, it is required by the disclosure (see, page 5, line 15). There is no any indication in the '557 document which may tend to show that using three actuators is inadequate in any way. Accordingly, the '557 document neither suggests to use fewer than three actuators, e.g., two actuators recited in claims 1 and 24, nor motivates a person having ordinary skill in the art to do so. To the contrary, if the device of the '557 document had fewer than three actuators, the device would likely be defective due to the problems with insufficient flow discussed above. Thus, it can be concluded that the '557 document teaches away from using only two actuators, strongly reinforcing the conclusion that the apparatus claimed in claim 1 of the present application is non-obvious in view of the '557 document.

With regard to the Iwasaki et al. patent, it is submitted that Iwasaki et al. do not teach the apparatus having two piezoelectric actuators as recited in claims 1 and 24 of the present application. As correctly pointed out by the Examiner, what Iwasaki et al. do describe is a cylindrical chamber having ring actuators 1 and 2 shown by FIG. 4. However, the actuators in Iwasaki et al. are not piezoelectric elements as required by claims 1 and 24, but rather are ultrasonic transducers (see, e.g., Kawasaki et al., Col. 3, lines 63 and 68 and Col. 4, lines 1-3).

Clearly, the action of the piezoelectric elements in the present application and the ultrasonic transducers in Kawasaki et al. are based on cardinally different scientific and technical phenomena. The piezoelectric actuators of the present invention are based on the generation of the mechanical stress in a dielectric crystal when electric voltage is applied to the crystal. As a result of the induced mechanical stress, the piezoelectric actuator moves, transmitting the pressure to the fluid and eventually forcing the fluid through the nozzle. To contrast, Kawasaki et al. use ultrasound to create pressure waves and thus generate the movement of the ink.

It is therefore submitted that one having ordinary skill in the art would not be motivated to modify the teachings of Iwasaki et al. to replace the ultrasound transducers with the

piezoelectric actuators. There is no suggestion to do so in Kawasaki et al., as the devices of the present invention and those disclosed by Kawasaki et al. belong to different technical fields.

To summarize, neither the '557 document nor Kawasaki et al. reference discloses or suggests the apparatus claimed in claim 1 or the method claimed in claim 24. Accordingly, each of claims 1 and 24 is patentably distinguishable over the '557 document and over the Kawasaki et al. patent. Each of claims 2 and 3 depends on claim 1. Consequently, each of claims 2 and 3 is patentably allowable for at least the same reason. Each of claims 25 and 26 depends on claim 24. Consequently, each of claims 25 and 26 is patentably allowable for at least the same reason. Reconsideration and withdrawal of the rejection of claims under 35 U.S.C. §103(a) are, therefore, respectfully requested.

In the Application of:  
Glenn A. Sasaki  
Application No.: 09/930,590  
Filed: August 15, 2001  
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PATENT  
Attorney Docket No.: AURO1400-1


### CONCLUSION

In view of the above amendments and remarks, reconsideration and favorable action on all claims are respectfully requested. In the event any matters remain to be resolved, the Examiner is requested to contact the undersigned at the telephone number given below so that a prompt disposition of this application can be achieved.

Enclosed is a check in the amount of \$18.00 to cover the extra claim fee. The Commissioner is hereby authorized to charge any additional fees associated with the filing submitted herewith, or credit any overpayment, to Deposit Account No. 50-1355. A copy of the Transmittal Sheet is enclosed.

Respectfully submitted,

Date: September 30, 2004



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